

RELATION BETWEEN MOISTURE CONTENT OF THE SOIL AND THE OPTIMUM DEPTH OF PLANTING CORN

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In 1934 the corn seedlings in one particular series of hand-planted plots of the Illinois Corn Performance Tests¹ were markedly more vigorous and uniform than those in the other series.

The question naturally arose as to the cause of this difference. Since all the series were planted with the same kind of corn, the difference could not have been due to a difference in quality of seed. The cause of the variation had to be due to some difference in the manner of planting. Since the soil to a depth of three inches was unusually dry there was the possibility that depth of planting was the factor.

Growth of Corn Seedlings in Dry Soil.—In order to determine the influence that moisture content of the soil has on the growth of corn seedlings, six samples of soil were prepared from a field being summer fallowed on the Agronomy South Farm at Urbana. Some soil was dried on a bench in the greenhouse. It was mixed with moist soil in such proportions as to make samples of two different moisture contents. One contained 3.3 and the other 4.6 percent moisture. Four other samples were taken from different levels in the field so as to get soil carrying diverse amounts of moisture. The moisture content of the various samples thus collected was as follows: 5.2, 5.5, 6.8, and 8.1 percent.

One hundred kernels of corn were planted in each lot of soil in the greenhouse. At the end of seven days the seedlings were dug up and shoot and root measurements were made. The results are shown graphically in Figure 1.

No growth occurred in the soil containing 3.3 percent of moisture. Growth was apparently normal in the soil containing 8.1 percent of moisture. Seedling growth in the other lots of soil was roughly in

proportion to the amount of moisture present. The development of roots in soils lacking in moisture was strikingly greater than the development of plumules in the same soils. This shows that the minimum amount of moisture for plumule growth is at a higher level than it is for root growth. It also indicates that relative dryness of soil is a factor in the germination and seedling development of corn.

Depth of Planting Corn in Dry and Moist Soils.—In order to determine what influence depth of planting has on the growth of corn plants and the yield of grain a field experiment was conducted in 1939 and in 1940. Seed of good quality was planted by hand at depths ranging by one-inch intervals from one to six inches. To attain the desired depth of planting the soil in each hill was opened with a spade to approximately the depth wanted. Three kernels of corn were dropped into the opening, and with the end of a ruler resting on top of the kernels, the soil was filled in to exactly the

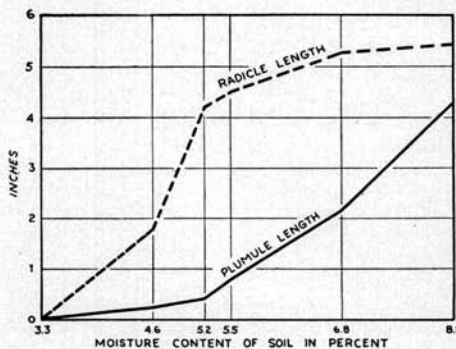


Fig 1.—Average length of plumules and radicles produced by corn seedlings during seven days' growth in soil containing different percentages of moisture.

¹ Dungan, G. H., Holbert, J. R., Mumm, W. J., Bigger, J. H., and Lang, A. L. Illinois corn performance tests—results for 1934. Ill. Agr. Exp. Sta. Bull. 411:58, 59. 1939.

TABLE 1.—INFLUENCE OF DEPTH OF PLANTING CORN IN A DRY SOIL AND IN A MOIST SOIL ON PERCENTAGE FIELD STAND, HEIGHT OF PLANTS, AND YIELD OF GRAIN PER ACRE. URBANA, ILLINOIS.

Depth of planting	Proportion of a perfect stand	Average height of plants 36 days after planting	Yield of shelled corn per acre
<i>inches</i>	<i>percent</i>	<i>inches</i>	<i>bushels</i>
Dry Soil—1939			
1.....	83	23.8	78.0
2.....	98	29.3	110.5
3.....	95	32.1	113.2
4.....	92	29.6	111.3
5.....	88	28.8	100.6
6.....	70	24.4	78.4
Moist Soil—1940			
1.....	95	28.0	105.3
2.....	83	27.5	94.7
3.....	88	26.2	103.0
4.....	64	25.5	72.8
5.....	67	24.1	81.1
6.....	67	23.0	73.2

one-inch level, two-inch level, etc. Each hill was considered as a separate plot or unit. Twenty-two separate hills were planted at each depth.

The amount of rainfall prior to and immediately following planting was very different in the two years. Soil conditions at planting time in 1939 were dry, but in 1940 they were moist and favorable. In 1939, a total of .92 inch of rain fell during the three weeks just ahead of corn planting and only .03 inch fell during the ten days after planting. This difference in the moisture conditions at planting time and following planting is reflected in the germination, plant height, and yield records which are shown in Table 1.

In the dry soil the highest percentage field stand was obtained from the two-inch planting depth. In the moist soil the best stand was from the one-inch depth. In the dry soil the greatest average plant height 36 days after planting came from the three-inch planting. One-inch planting produced the tallest plants

in the moist soil, whereas the one-inch planting in the dry soil produced the shortest plants.

The yields also show wide differences attributable to depth of planting in dry and moist soil. The lowest yield in 1939 was from one-inch planting whereas in 1940 the highest yield was from the one-inch depth. Good yields in dry soil were obtained from the two-, three-, and four-inch planting depths. In the moist soil the yields dropped off sharply for plantings deeper than three inches.

Apparently the optimum depth of planting corn depends upon soil conditions. If the soil is amply supplied with moisture, corn can be planted as shallow as one inch with the expectation of maximum yields. If, on the other hand, the surface soil is dry, corn should be planted deeper than one inch to get maximum yields. The exhaustion of the seedling as a consequence of deep planting is seemingly less harmful than the stunting influence of insufficient moisture near the surface.